Serial #:

UNIVERSITY OF BAHRAIN
COLLEGE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE

ITCS 385 – Database Systems

Midterm
Semester I, 2013-2014

Date: Thursday, November21st, 2013 Time: 3:00pm - 4:30pm

Name	
Student I.D.	
Section	[1] UTH 09:00 – 09:50 [2] UTH 10:00 – 10:50 *Please tick one* [3] UTH 12:00 – 12:50

Question 1 (PART A)	9	
Question 1 (PART B)	9	
Question 2	12	
Question 3	12	
Question 4	8	
TOTAL	50	

Notes:

1. Your answers must be written on the question paper and in the place allocated. Any answer written on any other place will not be marked.
2. Use the back of the pages for any rough work, BUT remember rough work will not be marked.
3. Do not give more than one answer (alternative solutions) to the same question; if you do so then only the first answer will be marked.
4. **Switch off your mobile** and keep it in your pocket or bag.

Question 1
PART A [3 + 3 + 3 = 9 marks]

1. **Define the following terms:**

   DBMS: _____

   _____

   _____

   DBA: _____

   _____

   _____

Consider the following database schema for a car insurance company to answer Question (2) & (3):

Employee (ID, name, DepartmentID)
Department (ID, name, building)

2. **Define the term 'Integrity Constraints'? Show two examples of integrity constraints for the company database above.**

   [Definition]:

   _____

   _____

   [Examples]:

   _____

   _____

   _____

3. **List two (2) different end users of the company database, to which user category would each belong (explain why)?**

   [User 1]:

   _____

   _____

   _____

   [User 2]:

   _____

   _____

   _____

Question 1
PART B [3+ 6 = 9 marks]

1. **Define the following terms:**

   DDL: _____

   _____

   _____

   Data Independence: _____

   _____

   _____

2. **Briefly explain the centralized and three-tier client/server architectures. Also, for each of the two architectures, give one example of a database system that would be appropriate for.**

Question 2 [12 marks]

A recording studio needs your help to design its database. The studio stores information about musicians and albums. Draw an ER diagram describing the studio's database for the scenario described below. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

Each musician who records at the studio has a unique ID and a name, and no two musicians have the same name. Musicians form bands. A band is described by a unique name and has an address. Each band has at least one musician as a member but a musician should be a member of exactly one band. Bands record albums, which have a title and a year of production. Each album is recorded by exactly one band, and no two albums (for the same band) have the same title and the same production year. Each album is produced by exactly one musician. It is not necessary that the producer musician is a member of the recording band. Albums are made up of songs, described by their titles. Naturally, each song belongs to exactly one album, and all songs on the same album have different titles.

Question 3 [3 + 3+ 6 = 12 marks]

Consider the following database state and data definition for a university database. The database keeps track of the university instructors, courses, departments and the courses taught by instructors each semester and each year.

Instructor

instructorID	instructorName	deptID
100	Dr. Adam	51
200	Dr. Jim	31

Course

courseNo	courseName	credits	offeringDeptID
501	Programming I	3	51
301	Database II	4	51
521	Math I	3	31

Teaching

instructorID	courseNo	Sem	Year	sectionNo	roomNo
100	501	1	2012	1	S101
100	501	2	2012	2	S105
200	521	1	2013	3	S104

Department

deptID	deptName	collegeName
51	CS	IT
31	Math	Science

Attribute	Format
instructorID, courseNo deptID, instructorID offeringDeptID, sectionNo	Integer
Year	Integer: four digits.
Sem	Integer: { 1 or 2}

Attribute	Format
courseName, instructorName deptName, collegeName, roomNo	Characters: max size 25
credits	Integer: {3 or 4}

PART A

The *Teaching* relation was left with no primary key. Specify an appropriate primary key for this relation, stating any assumption you make.

PART B

Specify the foreign keys for each relation above, stating any assumption you make.

Relation	Foreign Key(s)
Instructor	
Course	
Teaching	
Department	

PART C

Suppose that each of the following operations is applied directly to the University Database. For each operation, indicate whether this operation will be successful (i.e. will lead to a valid relation state or not), if not, specify the reason(s).

a. ***insert into Department values (52, NULL, 'Science');***

Successful operation: (YES / NO)

If NO, WHY_____

_____

_____

_____

b. ***DROP TABLE Teaching;***

Successful operation: (YES / NO)

If NO, WHY_____

_____

_____

_____

c. ***insert into Course values (503, 'Programming III', 2, 50);***

Successful operation: (YES / NO)

If NO, WHY_____

_____

_____

_____

Question 4 [3 + 2 + 3 = 8]

Consider the university database in Question (3) to answer the following SQL questions.

1. **Create the *Department* relation.**

2. **Change the collegeName from 'IT' to 'Information Technology'.**

3. **List the courseNo, sectionNo and roomNo of all courses taught in year 2012 by instructorID=100 in ascending order by courseNo.**